

APPENDIX IV

RECORDS AND REPORTS

1. RECORDS FOR PAYMENT. Records of quantities that are pay items must be kept for meaningful administration of any contract. Of necessity these records must be accurate, understandable, and sufficiently detailed to justify their acceptance if at variance with data presented by the contractor. Details are very important for a drilling and grouting operation. As grouting progresses it should be continuously evaluated. Records that must be kept of pay items should be expanded to log form so that decisions to "split-space" or split-space only to a certain horizon, to decrease or increase grouting pressures, to use generally thinner or thicker mixes, or to make any of the many decisions that may be required can be based on case histories of operations at the jobsite. Therefore, in addition to listing quantities, when, where, and how the quantities were obtained should also be recorded. After completion of the grouting, there is very little surface evidence to indicate the extent of grouting, and there is no way to determine actual quantities if a running account is not available. A form listing all pay items should be prepared for submittal to the project office on a daily or shift basis. All quantities listed on this form should be taken from the detailed records kept by inspectors in field notebooks. Notebooks should be turned in as they are filled for preservation as part of the permanent project records.

a. Drilling. It usually is not possible to have a full-time inspector assigned to each drilling unit on grout-hole drilling; but if more than one unit is operating on the same shift, a full-time drilling inspector should be present. In any case the drilling should be inspected several times each shift to obtain needed data and ensure compliance with the specifications. The inspector should be available for the start of each new hole and at the completion of any hole, zone, or stage. If the holes are inclined, he must make sure that each new hole is started at the correct inclination and in the right direction. He must make certain that all cuttings are washed out of the hole at the completion of drilling and that the hole is then properly capped or plugged. For the records he must have hole number, location, elevation, size, inclination data, driller's name, and the feet drilled for each hole in which work was done on any date or shift. If pipe, zone, and size of hole are pay items, quantities for each must be recorded. The records should also show water losses and approximate formation contacts as determined by the driller, if no core is recovered. The hole number and its location, elevation, and inclination should be shown at the top of a page in a field notebook. It is preferable to have only one hole to a page, but all information on that hole may be kept on the page if properly dated. The notebook should be available to the grouting inspector.

b. Pressure Testing and Pressure Washing. The pressure-test and pressure-washing records should show the hole number, location, elevation, depth of hole, zone, stage or packer setting as appropriate, and the starting and completion times of all testing and washing. The rate and pressure at which water is injected must be shown. If water vents from other holes their numbers and locations should be given. If connecting to a hole is a pay item and more than one connection per test is made, all the circumstances involved should be entered in the record. Information on the water table should be included in the pressure-test book or in the drilling records or both. A separate notebook should be used to record all pressure-test and pressure-washing data, and it also should be available to the grouting inspector.

c. Grouting. The grouting record should be more elaborate than the other records described because grouting is a more complicated operation and the grouting log not only serves as a record of the pay quantities, but because it also is the only detailed record of the grouting treatment in existence. The interpretation of the grouting logs may have a major bearing on decisions for further treatment either during or after construction. The log of grouting operations must contain the hole number, location, elevation, data on inclination, position in the order of grouting (primary, first intermediate, etc.), information on the portion of hole being grouted (depths and/or elevations, and stage or zones), and the date and shift the work was done. The log should show the starting and completion times, the time mixes were changed, the time water was injected, and the time of delays and the reasons therefor. Pressures, injection rates, location of leaks, and any other information pertinent to the understanding of the operation should be given. The pay quantities of all ingredients should be shown clearly. If payment is by a volume or weight unit for both placing and furnishing the ingredients, each unit placed is also a unit furnished and must be paid for under both items. If leftover grout from the last batch mixed for any hole is carried forward to the next hole, it should be accounted for in the log for the new hole. Leftover grout that is allowable waste as a result of cessation of grouting operations is paid only under the item or items for furnishing ingredients, since it was not placed. There are many acceptable forms for grouting logs. The sample log in appendix II is one of several forms of grouting logs that have been used for portland-cement grouting. It illustrates how an accurate accounting of all grout mixed can be made. The record of each batch of grout and its rate of injection provides detail that is insurance against miscounting batches and provides data that can be readily scanned for indications of abnormalities such as lifting. It also permits a supervisor to second guess the inspector and to evaluate his judgment.

2. **RECORDS FOR FUTURE REFERENCE.** In addition to records that must be kept to administer the contract, records should be kept for future reference. The field notebooks are the basic "as-built" records. However, other summary-type records are also desirable. If quantities are summarized by

tables, drawings locating all holes should accompany the tables. For a grout curtain, a geologic section through the grout holes is the best presentation. Holes may be represented by single lines with grout takes shown by zones in volume of cement and/or other materials. Primary and intermediate holes should be distinguished. Pressures, mixes, and setting times should be shown with the holes or in notes. For blanket grouting, mine filling, or contact grouting, a plan view of the grouted area showing hole locations and other pertinent data, as listed above, is usually the best way to show the grouting. Work sheets similar to such drawings, if kept up to date, are very useful in evaluating the grouting effort as work progresses and serve as a base for the "as-built" drawings.